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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/806,936	04/06/2001	Laurent Potin	205507US2XPC	7884

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EXAMINER
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AMARI, ALESSANDRO V

ART UNIT	PAPER NUMBER
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2872

DATE MAILED: 02/13/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/806,936

Applicant(s)

POTIN ET AL.

Examiner

Alessandro V. Amari

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 16 October 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 14-26 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 14-22 and 24-26 is/are rejected.
- 7) ☒ Claim(s) 23 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_ 6) ☐ Other: \_\_\_\_\_

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## DETAILED ACTION

### *Claim Objections*

1. Claim 24 is objected to because of the following informalities:

Regarding claim 24, line 2, the phrase "the second intermediate image" lacks proper antecedent basis.

Appropriate correction is required.

### *Claim Rejections - 35 USC § 102*

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 14-16, 20, and 24-26 are rejected under 35 U.S.C. 102(b) as being anticipated by Wood U.S. Patent 4,763,990.

In regard to claim 14, Wood discloses (see Figure 2) an optical device for a helmet viewfinder presenting a collimated image to a user, comprising: an imager (20a) and an off-axis spherical concave mirror (12); a diffractive field mirror (28) for correcting distortion of an image presented to the user which is due to the off-axis spherical concave mirror wherein the distortion corrected by the diffractive field mirror is an off-centering distortion of the second kind corresponding to an absence of symmetry of revolution caused by the spherical concave mirror being viewed at an oblique angle with respect to an axis of the spherical concave mirror as described in column 3, lines 10-40. Although the prior art does not specifically disclose correcting off-centering distortions,

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this feature is seen to be an inherent teaching of that device since the device has an off-axis mirror, which creates a misshaping of the image, and the device corrects for this negative distortion in order to present a proper image to the observer.

Regarding claim 15, Wood discloses (see Figure 2) that the diffractive field mirror is situated in a vicinity of an intermediate image (54) formed by said optical device, the vicinity having an extent limited to a maximum distance of the image beyond which resolution of the image at a center of a field of the device is degraded. It should be noted that the position at which the diffractive field mirror (28) is positioned is a maximum beyond which degradation will occur. In that, Wood teaches (see column 4, lines 12-20) that in order to produce a non-aberrated image to the pilot then the relay optics (26) must cooperate with the diffractive field mirror to form a preaberrated or intermediate image (54). Therefore this position is limited to the maximum distance from the intermediate image in order that the image not be degraded.

Regarding claim 16, Wood discloses that the diffractive mirror is placed said maximum distance from the intermediate image as described in column 4, lines 12-29. (See note for claim 15 above in regard to position of diffractive mirror).

Regarding claim 20, Wood discloses that the diffractive field mirror is a volume hologram recorded in a photosensitive material as described in column 3, lines 36-40 and column 6, lines 3-24.

Regarding claim 24, Wood discloses that the diffractive field mirror is situated in the vicinity of the second intermediate image (54) as shown in Figure 2.

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Regarding claim 25, Wood discloses (see Figure 2) that one or more optical power groups or optical relay groups (26) placed in a path of rays between the imager and the spherical mirror, upstream and/or downstream of the diffractive mirror, the one or more optical power groups comprising one or more lenses, at least one lens of which is convergent so as to give an aperture of the beams incident on the diffractive mirror which is smaller in comparison with an aperture of the beams incident on the spherical mirror as shown in Figure 2 and as described in column 4, lines 30-54.

Regarding claim 26, Wood discloses that the spherical mirror is semitransparent as described in column 8, lines 3-7.

***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 17-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wood U.S. Patent 4,763,990 in view of Chen et al. U.S. Patent 5,436,763.

Regarding claims 17, 18 and 19, Wood teaches the invention as set forth above as well as teaching (in regard to claim 19), that a face of a support of the diffractive field mirror in which the hologram is made is not planar as described in column 6, lines 15-19. However, Wood does not disclose that the diffractive field mirror is a digital plane numerical hologram with discrete variations or that the diffractive field mirror is a plane numerical hologram with a continuous profile. Chen et al. does teach that the diffractive

field mirror is a plane numerical hologram with a continuous profile and that the diffractive field mirror is a plane numerical hologram with a continuous profile as described in column 4, lines 27-31. It would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize the holograms as taught by Chen et al. in the device of Wood in order to provide the diffractive properties.

6. Claims 21-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wood U.S. Patent 4,763,990 in view of Wood et al. U.S. Patent 4,582,389.

Regarding claims 21 and 22, Wood '990 teaches the invention as set forth above but does not teach that the photosensitive material is on a transparent support of variable optical index or that the photosensitive material is on a transparent support of variable thickness. Wood et al. '389 does teach that the photosensitive material is on a transparent support of variable optical index as described in column 5, lines 54-64 and that the photosensitive material is on a transparent support of variable thickness as described in column 7, lines 1-6. It would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize the volume hologram as taught by Wood et al. in the device of Wood in order to obtain low surface spatial frequency of the hologram.

***Allowable Subject Matter***

7. Claim 23 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

8. Claim 23 is allowable over the prior art for at least the reason that the prior art fails to teach or reasonably suggest, "a power group placed between the spherical mirror and diffractive mirror which focuses a first intermediate image in proximity to said spherical mirror onto a second intermediate image" as set forth in the claimed combination.

The prior art of record, Wood teaches a head up display device comprised of an imager and an off-axis spherical concave mirror wherein a diffractive field mirror corrects aberration of the image presented to the user. However, Wood does not teach a power group placed between the spherical mirror and diffractive mirror which focuses a first intermediate image in proximity to said spherical mirror onto a second intermediate image and there is no motivation or teaching present to modify this difference as derived.

### ***Response to Arguments***

9. Applicant's arguments filed 17 October 2002 have been fully considered but they are not persuasive.

The Applicant argues that claim 24 does not lack antecedent basis since claim 24 depends on claim 23, which does recite "a second intermediate image".

In response to this argument, the Applicant would like to point out that in the amendment filed on 27 June 2002, the Applicant amended claim 24 to be dependent on claim 14, which does not recite "a second intermediate image", and not claim 23 as asserted. Therefore, the objection to this claim still stands.

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The Applicant argues that the device corrects distortion whereas the prior art, Wood corrects optical aberrations including spherical aberrations, coma and astigmatism. Applicant asserts that distortion is an image aberration, i.e., a geometrical flaw (deformation of shapes) and not a resolution flaw (optical quality of the image). In further support of this argument, the applicant notes that the terms “off-centering aberration” and “off-centering distortion” are not equivalent but rather two separate distinct characteristics and cites the following text from his specification (see page 2, line 35 to page 3, line 7 of the Applicant’s disclosure):

“[to] clear the user’s view, the spherical mirror is inclined with respect to the normal to his/her face and the user’s eye is no longer on the axis of the mirror. This arrangement has a drawback of resulting in a collimated image that is affected by optical aberrations, especially **off-centering aberrations**, which need to be corrected, at least partially. The inclination of the spherical concave mirror afflicts the collimated image with distortion, known as **off-centering distortion** of the second kind, characterized by a convergence of the verticals and an apparent curvature of the horizontals.”

In response to this argument, the Examiner would note that the above paragraph from the specification does not clearly show a distinction between an off-centering aberration and an off-centering distortion since the paragraph specifically refers to correcting for aberrations and distortions in regard to an off-axis spherical mirror and seems to be referring to the same kind of problem, i.e., off-centering deformation.



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Furthermore, the Examiner would like to cite the prior art, Hecht, page 267, left hand column, 4<sup>th</sup> paragraph that states as follows:

“Mirrors, with the singular exception of the plane mirror, suffer much of the same **monochromatic aberrations** as do lenses.” (emphasis mine)

Then, in Hecht, on page 269, right-hand column, 1<sup>st</sup> paragraph that states as follows:

“The last of the five primary, monochromatic aberrations is **distortion**.”

Hecht, on the same page 269, shows a negative distortion in Figure 6.33 (c), which is characterized by a convergence of the verticals and an apparent curvature of the horizontals. Thus, the distortion is, in fact a type of aberration and thus the terms are equivalent.

The Applicant further argues that the off-centering distortion of the second kind is characterized by an absence of symmetry of revolution. The Applicant cites Figure 2 of the disclosure as an example of this type of deformation (convergence of the verticals and an apparent curvature of the horizontals) and states that it is due to the inclination of the spherical collimating mirror with respect to the observation axis; i.e., it exhibits an absence of symmetry of revolution.

In response to this argument, the Examiner again cites the reference, Hecht, as explained above and directs the Applicant's attention to the distortion shown Figure 6.33 (c) on page 269 which is characterized by a convergence of the verticals and an apparent curvature of the horizontals.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alessandro V. Amari whose telephone number is (703)


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306-0533. The examiner can normally be reached on Monday-Friday 8:00 AM to 5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Cassandra Spyrou can be reached on (703) 308-1687. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9318 for regular communications and (703) 872-9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

ava *ava*  
February 5, 2003

  
**MARK A. ROBINSON**  
**PRIMARY EXAMINER**